Avian Vision Processing

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The official link for this solicitation is:
http://www.acq.osd.mil/osbp/sbir/solicitations/sbir20152/index.shtml

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Description:
Birds of prey, also known as raptors, are birds that hunt or feed on other animals. They are characterized by keen vision that allows them to detect prey during flight. Since vision is the most important sense for birds, and good eyesight is essential for safe flight, this group has a number of adaptations which give visual acuity superior to that of other vertebrate groups. The objective of this SBIR is to develop an innovative solution which will allow the operator to achieve the same sort of superior imaging and improved situational awareness available to avian predators. The effective focal length (EFL) of the imaging system itself should be able to change; simple digital magnification of an image does not provide the kind of image clarity discussed here. While variable focal length lenses have been demonstrated (see references), shortcomings have been identified both in the range of the EFL shift and in the resolution capabilities of the system. The intent of this effort is to push the boundaries of this technology and achieve extreme shift and resolution. This EFL shift should be maximized, with a minimum EFL of no more than 40mm, and a dynamic shift of 10x (threshold), 100x (objective). Time for EFL shift will be considered; while there is no rigid time requirement, the lens must be able to shift across it''s full dynamic range quickly (80% at 1000m. False alarms are to be minimized as much as possible. Image processing must be conducted on a man-portable computer system (laptop or smaller). Once detected, range to the target must be determined. Range is to be accurate to +/- 1m within 1000m. While passive range finding via computer vision (see reference) is preferred, active range finding (to include laser range finding) is permitted, however the ranging must be done automatically (i.e., the operator isn''t tasked with aiming a laser, the system instead aims and range-finds for the operator). PHASE I: Investigate

innovative optical solutions for imaging systems. Develop and document the overall optic component design and accompanying algorithms for operation/alteration of the lensing system. Develop support documentation for the lensing medium. Demonstrate a proof of principle of the design by producing a preliminary architecture concept (for example, lens size, sensor size/density) where image acquisition information can be displayed and analyzed with a computer system. Phase I deliverables will include: Monthly status reports, Final phase report, and demonstration hardware. PHASE II: Develop and demonstrate a prototype capability for insertion into a realistic, Government-supplied imaging system. The component must be capable of demonstrating key operational parameters (in particular alteration of EFL) in a laboratory environment. Include analytical studies and laboratory studies to physically validate the analytical predictions of separate elements of the technology. Identify representative components that are not yet integrated. Demonstrate ability to automatically locate and track a target within the imager’s field of view. Demonstrate the ability to accurately determine range to that target. Phase II deliverables will include: Monthly status reports, Final phase report, and prototype system (TRL 5/6) demonstrating functionality of lens, target detection, and rangefinding. PHASE III: Protoype system validation in a realistic (outdoor, controlled range) environment. Components are integrated into a meaningful form factor, and in a package which is robust enough for Soldier use. System size, weight, and power will be optimized for functionality and reliability. Manufacturability assessment will be conducted. Intent for this technology is to transition to the Fire Control family of systems, particularly the Fire Control-Squad and Fire Control-Precision Programs of Record (POR’s). Commercial opportunities (to be defined by vendor in proposal) will be explored.